## CLAIMS

1. A system comprising:

one or more processors;

a user interface;

a sensor; and

a computer readable medium storing instructions that, when executed by the one or more processors, cause the system to perform functions comprising:

generating, via the sensor, a signal representing vibrations originating from a blood vessel of a patient;

generating an intensity spectrum of the signal that indicates intensities of the vibrations with respect to oscillation frequencies of the vibrations;

identifying a first peak of the intensity spectrum that corresponds to a respiratory frequency of the patient and a second peak of the intensity spectrum that corresponds to a heart rate of the patient;

performing a comparison of a first intensity of the first peak with a second intensity of the second peak; and

generating, via the user interface, output indicative of the comparison.

2. A method comprising:

generating, via a sensor, a signal representing vibrations originating from a blood vessel of a patient;

generating an intensity spectrum of the signal that indicates intensities of the vibrations with respect to oscillation frequencies of the vibrations;

identifying a first peak of the intensity spectrum that corresponds to a respiratory frequency of the patient and a second peak of the intensity spectrum that corresponds to a heart rate of the patient;

performing a comparison of a first intensity of the first peak with a second intensity of the second peak; and

generating, via a user interface, output indicative of the comparison.

3. The method of claim 2, further comprising pressing the sensor with a pressure ranging from 10mmHg to 60 mmHg to a wrist, an ankle, an ear canal, an eye, or a neck of the patient while generating the signal.

4. The method of claim 2 or 3, wherein the blood vessel comprises a peripheral vein.

5. The method of any of claims 2-4, wherein generating the intensity spectrum comprises performing a Fast Fourier transform (FFT) upon the signal.

6. The method of any of claims 2-5, wherein identifying the first peak comprises identifying the first peak as being a most intense peak of any peaks within a range of 0.1 Hz to 0.5 Hz by determining that the first peak represents a greatest amount of energy of any peaks within the range of 0.1 Hz to 0.5 Hz.

7. The method of any of claims 2-6, wherein identifying the second peak comprises identifying the second peak as being a most intense peak of any peaks within a range of 0.5 Hz to 3.5 Hz by determining that the second peak represents a greatest amount of energy of any peaks within the range of 0.5 Hz to 3.5 Hz.

8. The method of any of claims 2-7, further comprising receiving an input identifying the second peak, wherein identifying the second peak comprises identifying the second peak based on the input.

9. The method of any of claims 2-8, further comprising determining, based on the comparison, a diffusing capacity of the patient's lung for carbon monoxide (DLCO).

10. The method of any of claims 2-9, further comprising determining based on the comparison, a diffusing capacity of the patient's lung for carbon monoxide divided by an alveolar volume (DLCO/VA).

11. The method of any of claims 2-10, further comprising determining, based on the comparison, an inspiratory reserve volume (IRV) for the patient's lung.

12. The method of any of claims 2-11, further comprising determining, based on the comparison, an inspiratory capacity (IC) for the patient's lung.

13. The method of any of claims 2-12, further comprising determining, based on the comparison, a maximum rate of oxygen consumption ($VO_2$ max).

14. The method of any of claims 2-13, further comprising determining, based on the comparison, a work of breathing for the patient.

15. The method of any of claims 2-14, further comprising determining, based on the comparison, a pleural pressure for the patient's lung.

16. The method of any of claims 2-15, further comprising commencing, adjusting, or ceasing a treatment for the patient based on the comparison.

17. The method of claim 16, wherein commencing, adjusting, or ceasing the treatment comprises adjusting a dosage, frequency, or duration of an oxygen treatment for the patient.

18. The method of claim 16, wherein commencing, adjusting, or ceasing the treatment comprises commencing, adjusting, or ceasing a continuous positive airway pressure (CPAP) treatment for the patient.

19. The method of any of claims 2-18, wherein generating the signal comprises generating the signal such that the signal represents the vibrations that are generated via retrograde transmission of a negative pressure exerted on a venous system of the patient by inspiratory pressures.

20. A non-transitory computer readable medium storing instructions that, when executed by a system, cause the system to perform functions comprising:

generating, via a sensor, a signal representing vibrations originating from a blood vessel of a patient;

generating an intensity spectrum of the signal that indicates intensities of the vibrations with respect to oscillation frequencies of the vibrations;

identifying a first peak of the intensity spectrum that corresponds to a respiratory frequency of the patient and a second peak of the intensity spectrum that corresponds to a heart rate of the patient;

performing a comparison of a first intensity of the first peak with a second intensity of the second peak; and

generating, via a user interface, output indicative of the comparison.